

IN THE SPECIFICATION:

Please amend paragraph number [0008] as follows:

[0008] As the field emission array and its associated cathodo-luminescent display are both generally planar structures and are disposed relatively close to one another, the field emission display (“FED”) devices of which the field emission array and cathodo-luminescent display are a part are typically relatively thin, flat devices. Thus, field emission displays are compact relative to display devices that include cathode ray tubes, and have found widespread use in many types of portable electronic devices, such as portable computers and video cameras, or ~~“camcorders”~~, “camcorders.”

Please amend paragraph number [0017] as follows:

[0017] Regions of conductively doped n-type semiconductive material, which are referred to herein as n-type semiconductor wells or simply as n-wells, are defined in the substrate. These n-wells may comprise the column lines of a field emission array. ~~N-type~~ N-type semiconductive materials conduct current by means of the free electrons of a dopant material.

Please amend paragraph number [0018] as follows:

[0018] The interface between each n-well and the p-type semiconductor substrate of the field emission array defines a so-called “p-n junction” or ~~“n-p junction”~~, “n-p junction.” A depletion region, which includes relatively non-charged materials, exists at the p-n junction. Thus, as is known in the art, a contact potential exists at the p-n junction.

Please amend paragraph number [0022] as follows:

[0022] As the voltage of the n-well of an emission pixel decreases, the voltage of the n-well is communicated to the first side of the capacitor. As the source node of the first transistor and, thus, the second side of the capacitor, is preferably charged to the baseline potential, the voltage at the second side of the capacitor and, thus, the voltage of the source node

of the second transistor drops until it is substantially the same as the voltage of the n-well. Upon turning the second transistor “on” (i.e., upon opening the gate of the second transistor), the voltage is transferred to the drain node of the second transistor. The voltage of the second transistor, which is now substantially representative of the amount and type of radiation that impinged the p-n junction of the emission pixel, may then be measured by the scan circuit that communicates with the drain node of the second transistor. Upon turning the gate of the second transistor “~~off~~”, “off,” the source node of the second transistor is electrically isolated from the voltage of the n-well. A value representative of the voltage measured by the scan circuit at the drain node of the second transistor, which represents the radiation detected by the emission pixel, may then be stored, as known in the art.

Please amend paragraph number [0037] as follows:

[0037] With continued reference to FIG. 1, the signal transmission circuit 26 associated with each emission pixel 14 includes a first transistor 28, or baseline potential transistor, which is illustrated in phantom since first transistor 28 extends into or out of the plane of the page, and a second transistor 30, which is also referred to herein as a signal transmission transistor. First transistor 28 and second transistor 30 may share an n-well 32, which acts as the drain 34 (FIG. 2), or drain node, of both first transistor 28 and second transistor 30. First transistor 28 also includes a gate 36 (FIG. 2) and a source 38, or source node, both of which are illustrated in phantom. Source 38 may communicate with a drain voltage, V_{DD} . Second transistor 30 includes a gate 40 and a source 42, which is also referred to herein as a source node. Source 42 communicates with a scan circuit 44 of a type known in the art.

Please amend paragraph number [0043] as follows:

[0043] The n-well 16 and drain 34 of an emission pixel 14 are each charged to a baseline potential. Accordingly, the back side 13 of substrate 12 at emission pixel 14 is shielded from radiation, such as by a shutter 45. Alternatively, with reference to FIG. 2A, field emission array 10 may include a shutter 45. At reference 101 of FIG. 3, gate 36 of first transistor 28 is

turned “on” while the back side 13 of substrate 12 at emission pixel 14 is shielded from radiation. Alternatively, with reference again to FIG. 2A, gate 36 of first transistor 28 may be turned “on” while shutter 45 of FIG. 2A is in the closed position. Shielding back side 13 or closing shutter 45 permits n-well 16 to return to its original, or base, voltage, prior to detecting radiation R from a portion of an object O. This original voltage sets the voltage difference between extraction grid 22 and emitter tips 18 below the threshold voltage that causes emitter tips 18 to emit electrons. Therefore, as shutter 45 is closed, emitter tips 18 do not emit electrons. As gate 36 of first transistor 28 is turned ~~“on”~~, “on,” at reference 101 of FIG. 3, a substantially constant drain source voltage, which comprises the baseline potential (V_{DD}), is transferred from source 38 of first transistor 28 to drain 34. Gate 36 is then turned ~~“off”~~, “off,” at reference 102 of FIG. 3.

Please amend paragraph number [0045] as follows:

[0045] As the voltage on the n-well 16 side of capacitor 46, at first conductive component 48, drops, the voltage on the drain 34 side of capacitor 46, at second conductive component 52, substantially correspondingly drops. Capacitor 46 stores the voltage of drain 34 until gate 40 of second transistor 30 is turned ~~“on”~~, “on,” at reference 106 of FIG. 3. As gate 40 of second transistor 30 is turned ~~“on”~~, “on,” the reduced voltage of drain 34 is communicated or transferred to source 42 of second transistor 30, which may be scanned, at reference 108 of FIG. 3, to determine the intensity or type of radiation incident with emission pixel 14.

Please amend paragraph number [0047] as follows:

[0047] The process may then be repeated to detect, display, and transmit a signal representative of subsequent radiation ~~“images”~~. “images.” Gate 36 of first transistor 28 may be turned “off” and radiation permitted to impinge the back side 13 of substrate 12 at emission pixel 14, at reference 102 of FIG. 3, to facilitate the sensing or detecting of another image of radiation by emission pixel 14 and the transmission of a signal representative of the radiation through second transistor 30.

Please amend paragraph number [0049] as follows:

[0049] With reference to FIG. 4, a system 60 is shown, which includes field emission array 10, a scan circuit 62 associated with field emission array 10, a processor 63 in communication with scan circuit 62, a recording mechanism 64 in communication with processor 63, a substantially flat display panel 66, or ~~cathode-luminescent~~ cathodo-luminescent display, spaced apart from field emission array 10 in substantially mutually parallel relation therewith, and other components, as known in the art.

Please amend paragraph number [0059] as follows:

[0059] A silicon substrate by itself has too high a band gap to detect longer wavelengths (e.g., 2,500 to 10,000 nm) of electromagnetic radiation. Accordingly, referring again to FIG. 1, field emission array 10 may optionally include a substrate 12 of low band gap material, which is also referred to herein as a “detection enhancement material,” of a type known in the art to enhance detection of longer wavelengths of electromagnetic radiation by field emission array 10. Low band gap materials, such as mercury-cadmium-tellurium alloys and other materials having electrical characteristics that are more readily altered than those of silicon by electromagnetic radiation of relatively long wavelengths, may be used as substrate 12 to facilitate the detection or display infrared radiation in thermal imaging applications or longer wavelengths of electromagnetic radiation. Detection enhancement materials such as ~~mercury-cadmium-tellurium~~ mercury-cadmium-tellurium facilitate the detection by field emission array 10 of wavelengths of electromagnetic radiation of from about 1,000 nm to about 10,000 nm and greater.

Please amend paragraph number [0060] as follows:

[0060] Alternatively, with reference to FIG. 1A, a field emission array 10' configured to detect wavelengths of electromagnetic radiation that are longer than visible light can include a silicon substrate 12' with a p-type region 76 (e.g., p-type silicon) having a p-type conductivity and an n-type region 78 (e.g., n-doped silicon) having an ~~n-type~~ n-type conductivity. A diffusion region 77, or p-n junction 17, is located between p-type region 76 and back side 13' of substrate 12' and is proximate to back side 13'. A coating 74, or layer, of detection enhancement material disposed on back side 13' proximate to diffusion region 77 facilitates the detection of radiation, the scanning of electrical impulses representative of the detected radiation, and the emission of electrons representative of the detected radiation in a manner similar to the detection, scanning, and emission effected by p-n junction 17 of semiconductor substrate 12. Alternative embodiments of field emission array 10', as well as examples of useful low band gap materials and dopant concentrations, are disclosed in U.S. Patent 6,441,542, issued to Hush et al. on August 27, 2002, the disclosure of which is hereby incorporated in its entirety by this reference.